Listing of Claims

This listing of claims will replace all prior versions, and listings, of the claims in this application.

Claim 1 (original): A direct conversion quadrature receiver, comprising:

a primary local oscillator (LO) that down-converts a received RF signal to a quadrature intermediate frequency (IF) signal; and

a dithering controller responsive to said quadrature IF signal generated by said primary LO for communicating a feedback signal back to said primary LO, said feedback signal controlling an oscillation frequency of said primary LO;

wherein said dithering controller offsets down-conversion of said RF signal by said primary LO from a zero-IF in order to reduce a phase and gain error of said quadrature IF signal.

Claim 2 (original): The receiver of claim 1, further comprising a phase and gain error measurement apparatus that measures a phase and gain error of said quadrature IF signal and generates a phase and gain error signal, wherein said dithering controller offsets said primary LO based on said phase and gain error signal.

Claim 3 (currently amended): The receiver of claim [[1]] 2, wherein said dithering controller controls said primary LO to step said quadrature IF signal in response to said phase and gain error signal.

Claim 4 (original): The receiver of claim 1, further comprising a memory storing a predetermined step size that steps said primary LO away from a current quadrature IF signal and a predetermined step limit that limits a stepping of said primary LO to a predetermined frequency range.

Claim 5 (original): The receiver of claim 1, wherein said dithering controller controls said primary LO to dither said quadrature IF signal according to a predetermined hop sequence.

Claim 6 (original): The receiver of claim 1, further comprising a memory storing a predetermined hop sequence that dithers said primary LO over a plurality of hop frequencies.

Claim 7 (currently amended). The receiver of claim 1, wherein the dithering controller further ~~comprising~~ comprises:

a filter bank comprising one or more I signal component filters and one or more Q signal component filters, said filter bank generates a plurality of frequency spectra from said quadrature IF signal;

an interferer level detector that measures each frequency spectra of said plurality of frequency spectra;

a frequency discriminator that generates a frequency number for each spectra output from said filter bank;

a level/frequency threshold including a predetermined power threshold that compares a signal power of each frequency spectra to said predetermined power threshold;

wherein said level/frequency threshold provides a step-required output to said LO dithering controller if a frequency spectra of said plurality of frequency spectra exceeds said predetermined power threshold.

Claim 8 (currently amended): The receiver of claim 1, wherein the dithering controller further ~~comprising~~ comprises:

a phase and gain error limit threshold that compares a current phase and gain error to a previous phase and gain error, generates a phase and gain error difference, and generates a step-required output to said LO dithering controller if said phase and gain error difference exceeds a predetermined phase and gain error limit threshold.

Claim 9 (currently amended): A method of offsetting a primary LO in a direct conversion quadrature receiver, comprising the steps of:

generating a quadrature intermediate frequency (IF) signal; and

offsetting said primary LO from a zero-IF signal to produce an offset quadrature IF signal, wherein said offsetting comprises dithering said primary LO over a plurality of hop frequencies in a predetermined hop sequence.

Claim 10 (currently amended): The method of claim 9, further comprising the step of measuring a phase and gain error in said offset quadrature IF signal, with said measuring producing a phase and gain error signal based on said phase and gain error ~~signal~~.

Claim 11 (original): The method of claim 9, wherein said offsetting comprises stepping said primary LO by a predetermined frequency step to produce an IF that is offset from zero Hertz.

Claim 12 (canceled)

Claim 13 (currently amended): The method of claim 9, wherein the method further comprises the steps of:

~~dithering said primary LO over a plurality of hop frequencies in a predetermined hop sequence;~~

measuring a phase and gain error in said quadrature IF signal for each hop frequency of said plurality of hop frequencies to create a plurality of phase and gain errors;

averaging the plurality of phase and gain errors to produce a phase and gain error average;

finding an outlier phase and gain error in said plurality of phase and gain errors; and

removing said outlier phase and gain error from said phase and gain error average.

Claim 14 (original): The method of claim 13, further comprising removing from said hop sequence a hop frequency that generated said outlier phase and gain error.

Claim 15 (currently amended): The method of claim 13, wherein said measuring, averaging, finding, and removing steps are iteratively performed.

Claim 16 (currently amended): The method of claim 13, wherein the step of finding an outlier phase and gain error further comprises the steps of:

~~averaging the plurality of phase and gain errors to produce a phase and gain error average;~~

finding a distance of each phase and gain error from said phase and gain error average; and

determining said outlier phase and gain error to be a phase and gain error that is a greatest distance from said phase and gain error average.

Claim 17 (original): The method of claim 13, wherein the finding step further comprises the steps of:

comparing each phase and gain error of said plurality of phase and gain errors to a predetermined outlier threshold; and

determining said outlier phase and gain error to be a phase and gain error that most exceeds said predetermined outlier threshold.

Claim 18 (original): The method of claim 13, wherein the finding step further comprises the steps of:

comparing each phase and gain error of said plurality of phase and gain errors to a predetermined outlier threshold; and

determining said outlier phase and gain error to be any phase and gain error that exceeds said predetermined outlier threshold;

wherein the determining step is capable of determining more than one outlier.

Claim 19 (original): The method of claim 9, further comprising the steps of:

creating a plurality of quadrature IF frequency spectra; and

comparing a frequency spectra of said plurality of quadrature IF frequency spectra to a predetermined power threshold;

wherein the offsetting step is performed if said frequency spectra exceeds said predetermined power threshold.

Claim 20 (original): The method of claim 9, further comprising the steps of:

measuring a phase and gain error in said quadrature IF signal;

creating a difference value of a difference between said phase and gain error and a previous phase and gain error; and

comparing said difference value to a predetermined phase and gain error limit threshold;

wherein the offsetting step is performed if said difference value exceeds said predetermined phase and gain error limit threshold.